



# The First Trocar Entry in the Laparoscopic Cholecystectomy, Which Technique?

## Laparoskopik Kolesistektomide İlk Trokar Girişi, Hangi Teknik?

İlk Trokar Girişi / The First Trocar Entry

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### Özet

**Amaç:** Laparoskopik cerrahide sık kullanımı olan verrees needle(VN) ve direct trokar(DT) insertion tekniklerini prospektif randomize bir klinik çalışma ile karşılaştırmayı planladık. **Gereç ve Yöntem:** Laparoskopik kolesistektomi uygulanan 400 hasta bu prospektif randomize klinik çalışmaya dahil edildi. İstatistiksel analiz için SPSS 17.0 (SPSS Inc., Chicago, IL) kullanıldı. İnflasyon teknik komplikasyonları 2 grupta incelendi. Major komplikasyonlar olarak açık ameliyata geçilmesini gerektiren durumlar (mesenterik laserasyon, kanama, organ perforasyonu, solid organ yaralanması ve damar yaralanmaları), ve minör komplikasyonlar (subcutan amfizem, extraperitoneal insflasyon) hastanede kalış süresini değiştirmeyen faktörler olarak belirlendi. **Bulgular:** Her iki grupta da mortalite gözlenmezken gruplar arasında ortalama yaş, erkek-kadın oranı, BMI ve ameliyat süreleri açısından bir fark gözlenmedi. 33 adet minör komplikasyon gözlendi. Bu komplikasyonların 27 Tanesi VN grubunda gözlenirken, DT grupta 6 minör komplikasyon gözlendi. VN grubta 3 adet major komplikasyon görülürken, DT grubunda major komplikasyon 1 adet gözlendi. **Tartışma:** Pneumoperitoneum kapalı olarak gerçekleştirilecek ise DT sokulması ile VN sokulması arasında güvenlik açısından bir fark yoktur.

### Anahtar Kelimeler

Laparoskopi; Trokar

### Abstract

**Aim:** We planned a comparison of verrees needle (VN) and direct trocar (DT) insertion techniques, which have been commonly used in laparoscopic surgical procedures, via a prospective randomized clinical study. **Material and Method:** 400 patients who had undergone laparoscopic cholecystectomy were included to the present prospective randomized clinical study. SPSS 17.0 (SPSS Inc., Chicago, IL) was used for the statistical analysis. Insufflation-related technical complications were investigated in two groups. The cases requiring open surgery (mesenteric laceration, bleeding, organ perforation, solid organ injury and blood vessel injuries) were determined as major complications. Minor complications (subcutaneous emphysema, phison and extraperitoneal insufflation) were established as factors not changing the length of hospital stay. **Results:** Mortality was not observed in both groups. There was no difference between the groups with respect to mean age, male to female ratio, BMI and duration of surgery. 33 minor complications were detected. 27 of these complications were observed in the VN group, whereas the number of minor complications seen in the DT group was 6. Major complications seen in the VN and DT groups were respectively 3 and 1. **Discussion:** If pneumoperitoneum is established by close method, there is no safety-related significant difference between the insertion of DT and VN.

### Keywords

Laparoscopic Entry; Complications

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## Introduction

The complications developing during trocar-dependent laparoscopic surgeries have been generally initial trocar placement-related[1]. Thus, the technique for initial trocar insertion in laparoscopic abdominal surgeries, which may create a rapid, safe and successful pneumoperitoneum, is very important. For this purpose, there are some defined techniques in the world. These are direct trocar insertion (DT), veress needle (VN) and open trocar insertion techniques[2]. The traditional VN insertion method is the technique preferred by general surgeons for the formation of pneumoperitoneum [3]. In numerous reports from the Gynecological centers DT-inserted pneumoperitoneum was stated to be as safe as VN-inserted pneumoperitoneum [4]. Although VN technique has been widely used, it has high rates of slow insufflation and life-threatening complications[5].

When the DT entry is used, the duration of surgery and the time of anesthesia is shorter and fewer equipments are and less carbon dioxide is required[4-6].

We planned a comparison of these two commonly used techniques using a prospective randomized clinical study.

## Material and Method

400 patients, who underwent laparoscopic cholecystectomy in the department of general surgery in Bartın National Hospital (Bartın, Turkey) between the dates January 2007 and July 2009, were included to the present prospective randomized study. A comparison of the performance of the initial peritoneal insufflation of laparoscopic cholecystectomy performed patients by using veress needle (VN) and direct trocar (DT) insertion techniques was planned. The patients who underwent an abdominal surgery previously were not included to the study. Gender, age, BMI indication, duration of the surgery, complications, mortality and morbidity rates of the patients were recorded. SPSS 17.0 (SPSS Inc., Chicago, IL) was used for the statistical analysis. The comparison of the groups was made statistically. Student's t-test and Fisher's exact  $\chi^2$  test were used for the statistical analysis. The technical complications of insufflation were examined in 2 groups. The states requiring open surgery were identified as major complications (mesenteric laceration, bleeding, organ perforation, solid organ injury and blood vessel injuries). The factors which did not change the duration of hospital stay were accepted as minor complications (subcutaneous emphysema, phison and extraperitoneal insufflation). Pneumoperitoneum was created using both methods in 200 patients of each group. A 10 mm subumbilical incision was made following the general anesthesia and relaxation of the patient. Subsequently, a 10 mm trocar (Tyco or Ethicon) was directly inserted into the peritoneal cavity after the abdominal wall on both sides of the incision was raised by upward lift using towel clamps. The presence of the trocar in the peritoneal cavity was controlled by a camera. Peritoneal insufflation was performed. The veress needle was inserted through a subumbilical incision in the VN group. The presence of the VN in the peritoneal cavity was confirmed using the syringe test. A 10 mm trocar knife was inserted into the peritoneal cavity in a locked position following the CO<sub>2</sub> insufflation. In the VN group, a pneumoperitoneum was created with VN (Tyco or Ethicon). Henceforth, by inserting other three trocars the laparoscopic operation of all patients in both groups

was continued. The operations were performed by experienced and qualified three surgeons.

## Results

Two groups, each of which consisting of 200 patients, were included in the present study. This prospective randomized clinical study was designed to evaluate a total of 400 patients who underwent laparoscopic cholecystectomy. This prospective randomized clinical study was designed to evaluate a total of 400 patients who underwent laparoscopic cholecystectomy. Group 1 was determined as the DT insertion, and group 2 as the VN group. Mortality was not observed in both groups. The mean age of the DT group was 46.8±9.5 years, mean BMI was 28.3±2.7 kg/m<sup>2</sup>, the mean duration of surgery was 49.3±10.9 minutes and male to female ratio was 24/176 and those of the VN group were observed respectively 48.1±10.4 years, 28.2±3.1 kg/m<sup>2</sup>, 51.0±9.3 minutes and 32/168. No differences were observed between the groups with respect to mean age, BMI, and male to female ratio. The demographic characteristics of the patients were displayed in table 1. 33 minor complications were observed, as displayed in table 1. 27 out of 33 minor complications were detected in the VN group; however, 6 were observed in the DT group. 1 and 3 major complications were seen in the DT and VN groups respectively. The results were not statistically significant. 3 major complications of the VN group were also observed as mesenteric laceration. Laparoscopic intracorporeal suturing was used to control the bleeding in two cases with major complications. Another mesenteric laceration regressed by itself without any need for intervention. One of the major complications encountered in the DF group was the injury occurring in one of the loops of the small bowel, which was then attempted to be repaired laparoscopic ally. However, the intervention was not successful. Bowel repair was performed with laparotomy.

Table 1. Demographic Data of Patients and Results Of The VN (Veress Needle) And The DT (Direct Trocar) Group

	VN group	DT group	P value
Number of cases	200	200	
Median age (years)	48.1±10.4	46.8±9.5	0.490 p>0.05
Male/female	24/176	32/168	0.200 p>0.05
BMI	28.2±3.1	28.3±2.7	0.863 p>0.05
Operation time (minutes) median	51.0±9.33	49.3±10.9	0.118 p>0.05
Minor complications (n)	27	6	0.586 p>0.05
Subcutaneous emphysema	8	1	
Extraperitoneal insufflation	19	5	
Major complications (n)	3	1	0.985 p>0.05
Mesenteric vessel laceration	3	0	
Visceral injury	0	1	
Solid organ injury	0	0	
Major vessel injury	0	0	

## Discussion

Laparoscopic applications have been performed widely all over the world. Numerous complications were reported during the induction of pneumoperitoneum and also due to the use of VN during laparoscopic procedures[7-8]. A lot of surgeons use the

VN and consider it as the safest method to induce pneumoperitoneum; however, some surgeons regard the DT as safer than the VN. In fact, in the first reports examined in the literature, insertion with a trocar has been accepted to be safer. There are two basic methods for insertion. The first one is the open method: the fascia is cut and the trocar is inserted directly into the abdomen. The other one is the closed method, performed by the VN and DT insertions. The open method has been considered reliable but problematic both in pneumoperitoneum development and time wasting. It emerges as an appropriate method for patients who underwent a previous operation or who are pregnant or too slim. It is a good operative method to detach adhesion between the abdominal wall and the bowel and to reduce the risk of injury especially in patients who underwent a previous abdominal surgery. Open method reduces the risk of organ or blood vessel injury and the surgeons provide reduction in morbidity and mortality by noticing the wound and providing operative repair[9]. Although open intervention seems to be appropriate for laparoscopic operations, complications of this technique have not been completely resolved as well. Major blood vessel injury risk is 3-9/10000 dir[10]. The most imminent complications are damage to the large blood vessels, empty organ injuries and formation of gas emboli [11]. No significant differences could be found between DT insertion and VN methods in the prospective randomized comparative studies[5-12]. Although the minor complication rate of the VN group was observed higher than that of the DT group in our investigation, no significant differences regarding major complication rates were observed between both groups. The difference observed in minor complications was not also statistically significant. Short-duration of surgery and anesthesia was necessary, less equipment and carbon dioxide was required when DT insertion was used[4-6]. The duration of surgery of the DT group was found lower than that of the VN group; however, no statistically significant difference was found in our study. The rate of failed pneumoperitoneum was lower with the DT insertion than with VN and this extraperitoneal insufflations may result in a failed laparoscopy[13-14]. Both obesity and extraperitoneal insufflations are risk factors [9]. Extraperitoneal insufflation occurred more frequently in the VN group than the DT group. The DT technique also reduces the number of blind insertions of instruments from two to one[14].

The initial pneumoperitoneum formed in the LC was created classically with the VN, which was due to the apprehension to avoid damage to intra-abdominal formations during trocar insertion. However, the VN has been reported not to be a complete intervention without a complication[15-16]. An initial intra-abdominal injury was reported after a successful pneumoperitoneum with the VN[17]. Creation of pneumoperitoneum with the VN has not been proved to have protective effects on the trocar injuries.

Nezhat et al. found the rates of minor complication respectively as 22%, 6% and 0%,200 in a randomized study performed with 200 patients. They reported as VN, Conventional DT and Disposable DT[2]. Vascular injuries occur more frequently in the VN insertion method compared to the DT insertion method[16]. Similar results were obtained in our study as well. 27 and 6 minor complications developed respectively in the VN group and the

DT group. 3 and 1 major complications developed respectively in the VN and DT groups. All formations of major complications occurred as mesenteric laceration in the VN group and as bowel injury in the DT group. In any observed no complications related to trocar entry, a study conducted in our country. post operative complications have been reported in this study [18]

### Conclusions

Even though the complication rate of the insertion technique and the surgeon's experience are effective factors in the establishment of the trocar insertion method, there is no statistically significant safety-related difference between the DT and VN insertion techniques if the pneumoperitoneum will be created using the closed technique.

### Competing interests

The authors declare that they have no competing interests.

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